

ABB solar inverters

Quick installation guide

TRIO-50.0-TL-OUTD

EN



In addition to what is explained below, you must carefully read and follow the safety and installation information provided in the installation information. Technical documentation as well as interface and management software for the product are available on the website. The equipment must be used in the manner described in the manual. Otherwise, the safety devices guaranteed by the inverter may be ineffective.

Power and productivity for a better world™ **ABB**

1. Labels and symbols

The labels on the inverter have the conformity marking, main technical data and identification of the equipment and manufacturer

POWER MODULE
DC WIRING BOX
AC WIRING BOX

Identifying label

① Inverter or wiring box model
 ② Inverter or wiring box part number
 ③ Inverter or wiring box serial number
 ④ Week/Year of manufacture

The labels attached to the equipment must NOT be removed, tarnished, dirtied, hidden, etc. If you are asked to enter the service password, refer to the serial number (SN: YYWWSSSSSS) shown on the conversion module (power module) label. In the manual and/or in some cases on the equipment, the danger and caution zones are indicated with signs, labels, symbols or icons.

Always refer to the manual	General warning - Important safety information	Hazardous voltage	Hot surfaces
Protection rating of equipment	Temperature range	Without insulation transformer	Direct and alternating current, respectively
Positive pole and negative poles of the input voltage (DC)	Always use safety clothing and/or personal protection equipment	Point of connection for grounding protection	Time needed to discharge stored energy

2. Choice of installation location

VERTICAL INSTALLATION

HORIZONTAL INSTALLATION

Environmental checks

- Consult the technical data to verify the environmental parameters to be observed
- These models can be installed either vertically or horizontally using the appropriate mounting bracket.
- Installation of the unit in a location exposed to direct sunlight should preferably be avoided. Direct exposure to sunlight could cause:
 1. power limitation in the inverter (with resulting decreased energy production of the system)
 2. premature wear of electronic/electromagnetic components
 3. premature wear of mechanical components (gaskets) and user interface.
- Do not install the equipment in a small, enclosed room where air cannot circulate freely.
- To avoid overheating, always make sure air can circulate around the inverter.
- Do not install the equipment near flammable substances (minimum distance: 3 m).
- Do not install the equipment on walls made of wood or other flammable substances.
- Do not install in rooms where people live or where the prolonged presence of people or animals is expected, because of the high noise level that the inverter produces during operation. The level of the sound emission is heavily influenced by where the inverter is installed (for example: the type of surface around the inverter, the general properties of the room, etc.) and the quality of the electricity supply.
- Avoid any electromagnetic interference that can compromise the correct operation of electronic equipment with consequent danger.

Installation position

- Install on a wall or strong structure capable of bearing the weight of the equipment.
- Install the equipment in a safe, easy-to-reach place.
- If possible, install the equipment at eye-level so that the status LEDs can be seen easily.
- Install at a height that takes account of the weight of the equipment.
- Install the equipment vertically with a maximum inclination of +/-5°.
- Choose a location that allows for some space around the equipment so as to be able to install and remove the equipment from the mounting surface without problems. Always respect the minimum distances indicated.
- For a multiple install, position the inverters side by side. If the space available does not allow for this arrangement, position the inverters in a staggered arrangement (as shown in the figure) so that heat dissipation is not affected by other inverters.

Final installation of the inverter must not compromise access to any disconnection devices that may be located externally. Please refer to the warranty terms and conditions to evaluate any possible exclusion due to improper installation.

Installation above 2000 meters

Due to air rarefaction (at high altitudes), particular conditions may occur:

- Less efficient cooling and therefore a greater likelihood of the device going into derating because of high internal temperatures
- Reduction of the dielectric resistance of the air that, in the presence of high operating voltages (DC input), can create electrical arcs (discharges) that may damage the inverter.

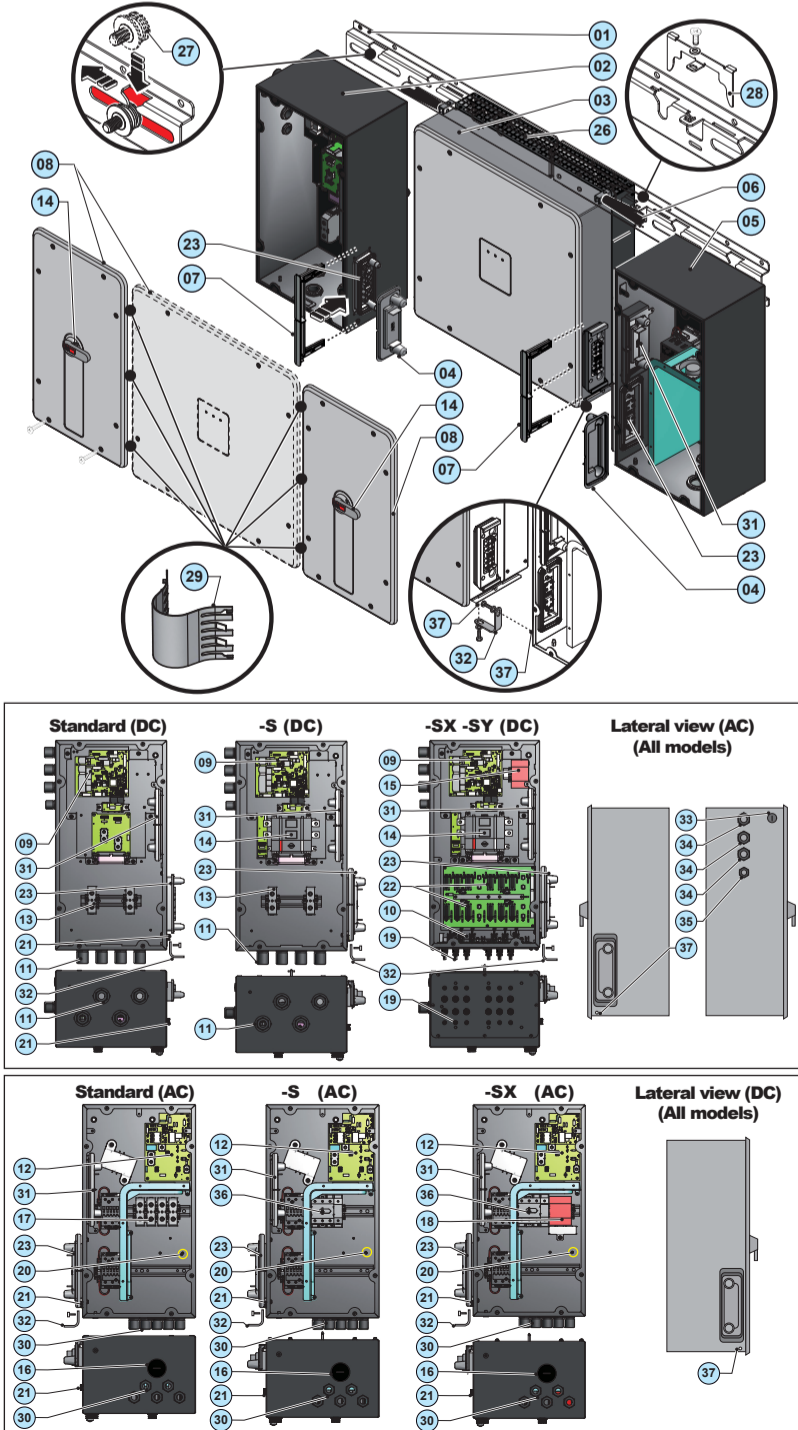
All installations at altitudes of over 2000 meters must be assessed case by case with the ABB Service department.

3. Inverter models and components

The inverter model should be chosen by a specialized technician who has a good knowledge of the installation conditions, the devices that will be installed externally to the inverter, and whether it will eventually be integrated into an existing system. The power module is the same for all configurations, but you can choose among different DC or AC wiring boxes depending on your specific needs:

- DC wiring box models: Standard; -S; -SX; -SY.
- AC wiring box models: Standard; -S; -SX;

- Main components**
- 01 Mounting bracket
 - 02 DC wiring box
 - 03 Conversion module
 - 04 Cap
 - 05 AC wiring box
 - 06 Handles
 - 07 Locking forks
 - 08 Front cover
 - 09 Communication and control board
 - 10 Positive (+) side string fuses
 - 11 DC cable glands
 - 12 AC filter board
 - 13 DC input terminal block
 - 14 DC disconnect switch
 - 15 DC over voltage surge arresters
 - 16 Single AC cable gland PG42
 - 17 AC output terminal block
 - 18 AC over voltage surge arresters
 - 19 Input connectors (mppt)
 - 20 Grounding terminal
 - 21 Anti-condensation valve
 - 22 Negative (-) side string fuses
 - 23 Interface quick connectors
 - 24 Spacers
 - 26 Heat sink
 - 27 Rear pins
 - 28 Top stops
 - 29 Conducting springs
 - 30 Single AC caps (not included)
 - 31 Cap storage box
 - 32 Ground connection brackets
 - 33 Wifi antenna M20 cap
 - 34 Service cable gland PG21
 - 35 Service cable gland PG16
 - 36 AC disconnect switch
 - 37 Ground bracket mounting points



4. Lifting and transport

Transport and handling

Transport of the equipment, especially by road, must be carried out by suitable ways and means so as to protect the components from violent shocks, humidity, vibration, etc.

Lifting

The means used for lifting must be suitable for bearing the weight of the equipment.

Unpacking and checking

The components of the packaging must be disposed of in compliance with all laws and regulations applicable in the country where the equipment is being installed. When you open the package, check that the equipment is not damaged and make sure all components are present. If you find any defect or damage, stop unpacking, contact the carrier, and promptly inform the ABB Service department.

Weight of the equipment units

Model	Weight
Conversion module	66 kg
DC wiring box	Std / -S : 13 kg -SX / -SY : 14 kg
AC wiring box	Std / -S : 14 kg -SX : 15 kg

5. List of supplied components

Components available for all DC wiring box models		Quantity	Components available in the bracket kit		Quantity (vertical kit)	Quantity (horizontal kit)
	Connector for the configurable relay	2		Bracket 01 for vertical wall mounting	1	0
	Connector for the communication and control signals	2		Bracket 02 for horizontal mounting	0	1
	Two-hole gasket for PG 21 signal cable glands and cap	2		M5x14 countersunk screw for mechanical clamping of semi brackets	4	10
	Two-hole gasket for PG 16 signal cable glands and cap	1		M6x16 hex screw (4 to clamp ground brackets and 2 for caged nuts)	6	6
	M6 nut to clamp the grounding terminal on the AC wiring box	1		Forks to attach the conversion module to the wiring box	2	2
	M6 toothed washer for securing the ground terminal to the AC wiring box	2		Back spacers for wall alignment (vertical installation)	4	0
	Technical documentation			Ground brackets 03 for wiring box/power module connection	2	2
	Fuseholder	12 or 16 (depending on the type of wiring box)		M6 plain washer (10/8 for mounting holes; 4 for ground brackets and 2 for caged nuts)	6	6
	Negative string fuses (-) (gPV - 1000Vdc - max rating 20A)	12 or 16 (depending on the type of wiring box)		M6 gear washer to clamp the ground connection bracket	4	4
				Conducting springs	6	6

6. Assembly instructions

Vertical wall mounting

The bracket 01 is supplied in two separate parts, assemble them using the 4 screws supplied. (FIG. 1)

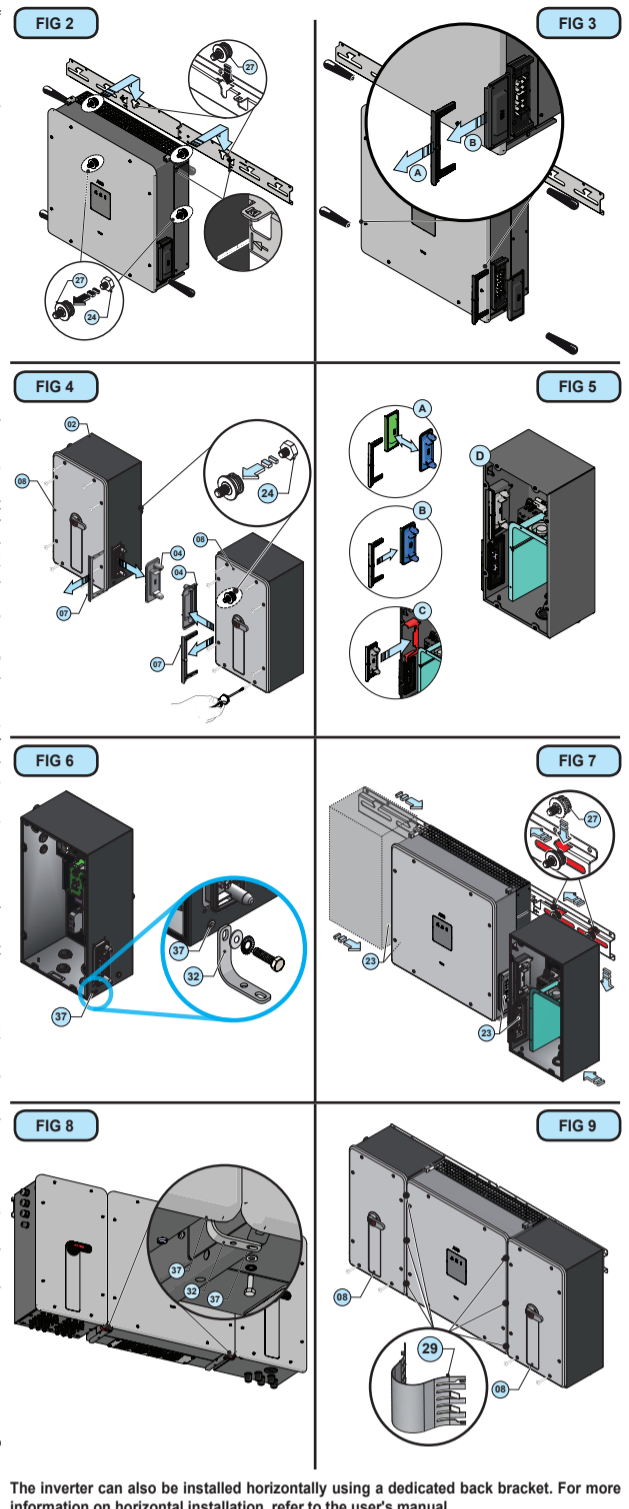
Position the bracket 01 perfectly level on the wall and use it as a drilling template. (FIG. 1)

Depending on the type of support, you might need to use specific anchorage points. The anchorage points must correctly support the inverter. Their type and size depends on the type of support. Assume that the total load is 4 times the weight of the inverter (4 x 95 kg=380 kg for the full-optional version). This load should be balanced between the 10 mounting points on the brackets. Depending on the type of anchor chosen, drill the required 10 holes (A) to mount the bracket. (FIG. 1)

Mount the bracket to the support (FIG. 1)

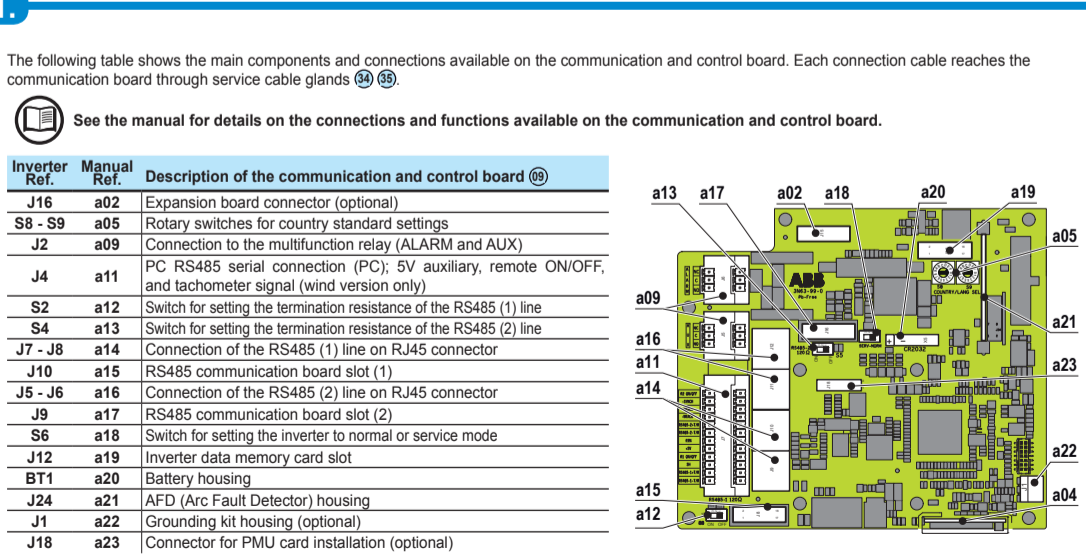
FIG. 1

- Insert the spacers (24) in the 2 studs (27) located on the lower side of the back of the power module. (FIG. 2)
- Lift the power module using the (optional) handles (26) or the (optional) M12 eyebolts, or another appropriate lifting device. (FIG. 2)
- Anchor the conversion module onto the central part of the bracket by inserting the head of the rear pins (27) at the top into the slots (25) on the bracket; check that the pins are inserted into the slots (25) correctly. Note: Other slots are indicated on the bracket (25) that, once fixed, must coincide or correspond with the line on the side of the conversion module; this indicates that they have been correctly positioned, i.e. with the rear pins (27) (in the upper part) correctly inserted into their slots. (FIG. 2)
- Remove the handles (26), if used, and the protection caps (24) of the connectors on both sides from the power module. N.B. To remove the caps (24) you need to: (a) slide the locking fork forward to remove it (27), (b) slide the protection cap (24). (FIG. 3)
- Rotate the disconnect switch on the wiring boxes and set it to position 0 (zero) otherwise it will not be possible to remove the front cover (28). (FIG. 4)
- Unscrew the 8 screws keeping the front covers (28) of the DC wiring box (28) and AC wiring box (28) in place. Dismount the covers and carefully replace them. (FIG. 4)
- Remove the caps (24) from both wiring boxes. To remove the caps (24) you need to: (a) slide the locking fork forward to remove it (27), (b) slide the protection cap (24). Caps should be kept in the special slot within each wiring box. Proceed as follows: (a) couple a connector cap of the power module (in green in the figure) with one from the wiring box (in blue in the figure). (b) Insert the plastic fork used to block the wiring box cap on the coupled connectors. (c) Insert the two connectors locked by the fork in the dedicated space within each wiring box. Repeat the same operation for the other pair of caps previously removed. Do not insert the metal forks used to clamp the caps on the conversion module in these dedicated spaces. They will be used to clamp connectors between wiring boxes and conversion module during the last installation steps. (FIG. 5)
- Before mounting the wiring boxes on the bracket, 2 ground brackets (29) should be installed on the dedicated mounting points (29) (one for each wiring box) marked with the symbol (29). The bracket is not symmetrical. When you install it, make sure that the side with 2 holes is facing downwards. The elements should be installed in the following order: ground bracket; flat washer; toothed washer; hex screw. In this phase, the screws should be left loose and not tightened. (FIG. 6)
- Insert 1 spacer (24) in the rear pins (27) located on the lower side of each wiring box. (FIG. 7)
- Mount the first wiring box on the bracket (29). To do so, insert the rear studs (27) located on top into the bracket slots. Then do the same with the other wiring box. This way, the wiring boxes will be somewhat detached from the power module, so that they won't interfere with the quick fit connectors (29). (FIG. 7)
- Couple the power module to the wiring boxes one at a time by sliding them horizontally onto the bracket (29) and make sure that the quick fit connectors are correctly inserted (29). (FIG. 7)
- Once coupling has been completed, the locking forks (27) previously dismantled during removal of the caps installed on the power module should be inserted into the appropriate seats on the quick fit connectors (29). This way, the wiring boxes get mounted to the power module. (FIG. 7)
- Insert the top stops (29) into the guides and block the screw on the caged nuts previously mounted on the bracket. (FIG. 7)
- Before mounting the covers (28), you must install the ground brackets (29) in the mounting points (29) located on the lower side between the power module and the 2 wiring boxes. The elements should be installed in the following order: ground bracket; flat washer; toothed washer; hex screw. Tighten the 2 hex screw on the grounding connection points (29) (marked with the symbol (29)) on the conversion module. Then also tighten the 2 screws (one for each wiring box) that fix the 2 ground brackets (29). Grounding of the 3 elements that are part of the inverter is ensured by the brackets (29). (FIG. 8)
- Proceed with the wiring and connections depending on the model. (FIG. 8)
- Mount the front cover (28) on the two wiring boxes (8 screws each). (FIG. 8)
- Mount the 6 conducting springs (29) between the power module cover (28) and the wiring box covers, in the unpainted areas. (FIG. 9)



The inverter can also be installed horizontally using a dedicated back bracket. For more information on horizontal installation, refer to the user's manual.

- Check for correct polarity in the input strings and absence of any leakage to ground in the PV generator. When exposed to sunlight, the PV panels supply direct voltage (DC) to the inverter. The inside of the inverter may only be accessed after the equipment has been disconnected from the grid and from the photovoltaic generator. (FIG. 10)
- Warning! The inverters referred to in this document are WITHOUT AN INSULATION TRANSFORMER (transformerless). This typology implies the use of insulated photovoltaic panels (IEC61730 Class A Rating) and the need to keep the photovoltaic generator floating respect to the ground: no terminal of the generator must be connected to ground. (FIG. 10)
- If input strings are parallel-connected, they must have the same installation conditions (same number of panel sets, panel type, orientation and tilt). Be sure to comply with maximum input current for quick fit connectors. (FIG. 10)
- DC-side connections may vary based on the wiring box used:
 - Standard / -S models use cable glands
 - -SX / -SY models use quick fit connectors (one per each string pole).
- Standard / -S models
 - These two models are connected through the DC input terminal block (13) by inserting the cable into the DC cable glands (11).
 - Maximum allowed cable diameter for cable glands is 13 - 21mm, while each single terminal of the terminal board supports cables with cross-section of up to 95 mm². DC input terminal board (13) supports both copper and aluminum cables.
 - Unscrew the cable gland and remove the cap, insert a cable of suitable cross-section and connect it to the DC input terminal board (13).
 - Once connection to the terminal block has been completed, retighten the cable gland firmly and check seal.
- SX / -SY models
 - For string connections using the -SX / -SY DC wiring box (14), the quick fit input connectors (MPPT) (19) located at the bottom of the mechanics are used. Quick fit connectors are divided into 4 groups composed of:
 - SX version. 3 or 4 quick fit connector couples based on the model of wiring box (12 or 16 couples in total)
 - SY version. 3 quick fit connector couples.
 - Refer to document "String inverters - Product manual appendix" available on ABB website www.abb.com/solarinverters for the quick fit connector brand and model used in the inverter. Based on the type of quick fit connectors installed on your inverter, you will have to use the same model for the respective counterparts (after checking for the matching counterpart on the manufacturer's Web site or with ABB).
- The use of non-matching counterparts for the quick fit connectors installed on the inverter may seriously damage the inverter and invalidates the product warranty. (FIG. 11)
- Connect all the strings included in the design of the system and always check the tightness of the connectors. If some string inputs are not used, check that there are covers on the connectors and install them if they are missing. This operation is necessary for the seal of the inverter and to avoid damaging the free connector that may be used at a later date. (FIG. 11)
- With these versions of the wiring box, you MUST directly connect the individual strings coming into the inverter (do not make field switchboards for parallel strings). This is because the string fuses situated on the positive side (+) (10) and negative side (-) (22) of each input are not sized to take strings in parallel (array). This operation may damage the fuse and cause inverter malfunction. (FIG. 11)



The following table shows the main components and connections available on the communication and control board. Each connection cable reaches the communication board through service cable glands (34) (35).

Inverter Ref.	Manual Ref.	Description of the communication and control board (16)
J16	a02	Expansion board connector (optional)
S8 - S9	a05	Rotary switches for country standard settings
J2	a09	Connection to the multifunction relay (ALARM and AUX)
J4	a11	PC RS485 serial connection (PC); 5V auxiliary, remote ON/OFF, and tachometer signal (wind version only)
S2	a12	Switch for setting the termination resistance of the RS485 (1) line
S4	a13	Switch for setting the termination resistance of the RS485 (2) line
J7 - J8	a14	Connection of the RS485 (1) line on RJ45 connector
J10	a15	RS485 communication board slot (1)
J5 - J6	a16	Connection of the RS485 (2) line on RJ45 connector
J9	a17	RS485 communication board slot (2)
S6	a18	Switch for setting the inverter to normal or service mode
J12	a19	Inverter data memory card slot
BT1	a20	Battery housing
J24	a21	AFD (Arc Fault Detector) housing
J1	a22	Grounding kit housing (optional)
J18	a23	Connector for PMU card installation (optional)

- The procedure for inverter commissioning is as follows:
 - Turn the DC disconnect switch to the ON position. If there are two separate external disconnect switches (one for DC and the other for AC), close the AC disconnect switch first and then the DC disconnect switch.
 - Few seconds after closing the DC disconnect switch, the GREEN "POWER" led starts flashing; after few more seconds the YELLOW "ALARM" led lights up and remains solid on to show that there is no mains voltage.
 - Turn the AC disconnect switch to the ON position. The YELLOW "ALARM" led turns off, while the GREEN "POWER" led keeps on flashing for a while, then remains solid on to show that the inverter has completed all tests and is ready for production.
 - LED behavior in case of errors: The YELLOW "ALARM" led lights up to indicate that a check through the Aurora Manager Lite software is needed; the RED "GFI" led lights up to show that a "leakage to ground" fault occurred.
- This check may require several minutes (from 30 seconds up to several minutes), depending on the distribution grid conditions and country-specific settings.

Load protection breaker (AC disconnect switch) and line cable sizing

To protect the AC connection line of the inverter, we recommend installing a device for protection against over current and leakage with the following characteristics.

TRIO-50.0-TL-OUTD		
Type	Automatic circuit breaker with thermal magnetic protection	
Voltage/Current rating	400 V / 100 A	
Magnetic protection characteristic	B/C	
Number of poles	3/4	

If a differential protection is installed, it must satisfy the following:
 - Type of differential protection: A/AC
 - Differential sensitivity: 300mA

Characteristics and sizing of the line cable

The AC connection is three-phase (triangle connection 3W+PE or star connection 4W+PE). The cross-section of the AC line conductor must be sized in order to prevent unwanted disconnection of the inverter from the distribution network due to high impedance of the line that connects the inverter to the power supply point.

The values are calculated in nominal power conditions, taking into account:
 1. a power loss of not more than 1% along the line.
 2. use of a copper cable, with rubber HEPR insulation and laid in open air.

Cross-section of the line conductor	Maximum length of the line conductor
max 70 mm² (-S/-SX)	33 m
max 95 mm² (Standard)	46 m
27 + 35 mm	66 m
	92 m
	122 m

Warning! Before proceeding with this procedure, make sure you have correctly isolated the inverter AC line downstream.

Warning! The inverter must be grounded before it is connected to the main supply network!

For the AC wiring box - Standard model

- The connection is made to the AC output terminal block (17) that supports cables with cross-section of up to 95 mm².

For the AC wiring box - -S / -SX models

- The connection is made directly to the disconnect switch (16) that supports cables with cross-section of up to 70 mm².
- To carry out the connections, a sheathed cable pass through a single AC cable gland (18) or different cables pass through single AC cable glands (18). The default solution is to use one single AC cable gland (18). If you need to use 5 single AC cable glands (18), their size must be M32.

Terminal blocks support copper cables.

If you need to use aluminum cables for AC connections, note the following:
 - The terminal board available on the Standard version supports both copper and aluminum cables.
 - On -S e -SX versions you need to use bi-metal terminals that support the coupling of aluminum cables with the internal contacts within the terminal block.

AC cable installation:

- Unscrew the cable gland(s) and remove the cap.
- Insert the cable of suitable cross-section.
- Connect the ground cable to the appropriate threaded metal insert or grounding terminal (20).
- Connect the conductors (Neutral, R, S, T) to the terminals on the AC output terminal board (17) in the Standard wiring box or directly to the disconnect switch (16) in the -S and -SX wiring boxes.
- Once the connection to the terminal block is complete, screw in the cable gland(s) firmly and check the tightness.

The inverter can be connected to the grid through a three-wire (triangle configuration) or a four-wire (star configuration) connection.
 - Set the b01 switch based on the connection configuration: choose 3WIRES for triangle configurations (R+S+T) or 4WIRES for star configurations (R+S+T+Neutral).
 - Before connecting the inverter to the distribution grid, set the country standard using the two a05 rotary switches.

Grid parameters can vary depending on the country where the inverter is installed. The grid standard associated with the installation country should be set before commissioning, and the installer must know the correct standard to configure.

The inverter should be configured using the a05 rotary switches. Before setting the rotary switches, make sure that the inverter is turned off! The table lists the settings of the a05 rotary switches for each country grid standard.

The grid standard list is valid at the time the manual is released, yet it is continuously updated to include the new grid standards the inverter becomes compatible with.

Settings will freeze when the inverter has been operating for 24 hours (it simply has to be powered by the PV generator).

Switch	1	2	Country grid standard
0	0	0	NOT ASSIGNED
0	1		GERMANY VDE 0126 @ 400V
0	8		UK - G59 @ 400V
0	C		GERMANY - BDEW @ 400V
1	0		PORTUGAL @ 400V
1	7		GERMANY-VDE AR-N-4105@400V
1	8		CEI-021 @ 400V EXTERNAL Prot.
2	0		TURKEY LV @ 400V
2	3		TURKEY HV @ 400V
2	4		CEI-016 @ 400V
2	8		FRANCE @ 400V
2	A		INDIA @ 400V

TRIO-50.0-TL-OUTD	
Input	1000 V
Maximum absolute input voltage (Vmax,abs)	360...500 V (default 420 V)
Input activation voltage (Vstart)	0.7xVstart...950 V (min 300 V)
Operating DC input voltage range (Vdcmín...Vdcmáx)	610 V
Rated DC input voltage (Vdcr)	610 V
DC input nominal power (Pdcr)	51200 W
Number of independent MPPT	1
MPPT DC voltage range (VMPPT mín...VMPPT máx) at Pacr	480...800 V
Maximum DC input current (Idc máx)	110 A
Maximum backfeed current (AC side vs DC side)	Negligible in normal operating conditions (3)
Maximum input short circuit current (Isc máx)	160 A
Number of DC input pairs	12 or 16 (-SX version) 12 (-SY version)
Maximum current for each input connector (only -SX/-SY versions)	13.5A for 16-input wiring box (4)
DC connection type	Screw terminal board with cross-section of up to 95 mm² (Standard and -S versions) PV quick fit connector (4) (-SX and -SY versions)
Type of solar PV panels that can be connected as input according to IEC 61730	Class A
Input protection	
Reverse polarity protection	Yes, from current limited source
Input over voltage protection - Varistor	Yes, 2
Over voltage protection - Modular surge arrester (-SX version)	Class II
Over voltage protection - Modular surge arrester (-SY version)	Class I + II
Isolation control	According to local standards
Characteristics of DC disconnect switch (model with DC disconnect switch)	1000 V / 200 A
String fuses (only -SX/-SY versions)	15 A (qPV / 1000 V / Maximum installable size 20 A)
Output	
AC connection to the grid	Three-phase (3W+PE or 4W+PE)
AC output nominal power (Pacr@cosφ=1)	50000 W
Maximum AC output power (Pac máx@cosφ=1)	50000 W
Maximum apparent power (Smax)	50000 VA
Rated AC grid voltage (Vacr)	400 V
AC output voltage range (Vacmín...Vacmáx)	320...480 Vac (1)
Maximum AC output current (Iac máx)	77.0 A
Contributory fault current	92.0 A
Rated output frequency (fr)	50 / 60 Hz
Output frequency range (fmin...fmax)	47...53 / 57...63 Hz (2)
Nominal power factor and adjustable range	> 0.995, 0...1 inductive/capacitive with max Smax
AC connection type	Screw terminal board with cross-section of up to 95 mm² (Standard version) Screw terminal board with cross-section of up to 70 mm² (-S and -SX versions)
Output protection	
Anti-islanding protection	In compliance with local regulations
Maximum external AC overcurrent protection	100.0 A
Output over voltage protection - Varistor	Yes, 4
Operating performances	
Maximum efficiency (ηmax)	98.30%
Weighted efficiency (EURO/CEC)	98% / -
Communication	
Remote monitoring	VSN300 Wifi Logger Card (optional), VSN700 Data Logger (optional)
Wireless local monitoring	VSN300 Wifi Logger Card (optional)
User interface	LED
Available ports	2 (RS485)
Environment	
Ambient temperature	-20...+60°C / -4...140°F with derating over 50°C / 122°F
Relative humidity	4...100% with condensation
Typical acoustic emission pressure	75 dB(A) @ 1 m
Maximum operating altitude without derating	2000 m / 6560 ft
Environmental pollution classification for external environment	3
Environmental category	Outdoor
Physical	
Environmental Protection Rating	IP 65
Cooling system	Forced air
Size (W x H x D)	1491 x 725 x 315 mm / 58.7" x 28.5" x 12.4"
Weight	total: 95 kg/209.5 lb - power module; 66 kg/145.5 lb 14 kg/30.8 lb for DC wiring box (full optional) - 15 kg/33.1 lb for AC wiring box (full optional)
Mounting system	Wall bracket to be positioned vertically or horizontally
Over voltage category according to IEC 62109-1	II (DC input) III (AC output)
Safety	
Isolation level	Without insulation transformer
Marking	CE
Safety class	I
1. The output voltage range may vary depending on specific country grid standards 2. The output frequency range may vary depending on specific country grid standards 3. In case of failure, it is limited by the external protection device on the AC circuit 4. Refer to document "String inverters - Product manual appendix" available on ABB Web site www.abb.com/solarinverters for the quick fit connector brand and model used in the inverter. 5. Maximum allowed current for each group of inputs (3 or 4 strings based on the DC wiring box version) is 54A	
Note: Features not specifically listed in the current data sheet are not included in the product.	

